Copies of the fragments unrolled by Sir Humphry Davy,—being fac-similes of the original imitations, executed by Sir William Gell, —are annexed to this communication.

Observations on Naphthaline, a peculiar Substance resembling a Concrete Essential Oil, which is apparently produced during the Decomposition of Coal Tar, by Exposure to a Red Heat. By J. Kidd, *M.D. Professor of Chemistry, Oxford. Communicated by* W. H. Wollaston, *M.D. F.R.S.* Read March 8, 1821. [*Phil. Trans.* 1821, *p.* 209.]

By passing coal tar through a red-hot iron tube, a portion of an aqueous fluid, and of a substance like tar, was obtained; the latter is black, soluble in ether, and partially in alcohol, of an aromatic odour, and sweetish taste. It was submitted to slow distillation, and among other products afforded naphthaline, a white concrete substance of an aromatic odour and taste, fusible at 180°, and scarcely soluble in water, but readily so in ether, alcohol, and oils.

Of the various characters of this substance, detailed by the author, its tendency to crystallize appears the most remarkable; its vapour condenses in rhombic plates, which are sometimes modified into hexagonal plates, by the incomplete development of the smaller angles of the usual rhomb.

The other substances obtained along with the naphthaline were ammoniacal water, and an oil of a bituminous and aromatic odour, boiling at 210°, and not congealing at 32°, highly inflammable, and readily soluble in alcohol and ether: there was also produced, during the latter part of the distillation, a yellow farina precipitable from its alcoholic solution by water, and fusible. Of these four substances, resulting from the distillation of the black liquid obtained by distilling coal tar, Dr. Kidd thinks that the water and the farina are products, and the other mere educts of the operation.

On the Aberrations of Compound Lenses and Object-Glasses. By J. F. W. Herschel, *Esq. F.R.S. &c.* Read March 22, 1821. [*Phil. Trans.* 1821, *p.* 222.]

To those mathematicians who have investigated the theory of the refracting telescope, it has often, says Mr. Herschel, been objected, that little practical benefit has resulted from their speculations. Although the simplest considerations suffice for correcting that part of the aberration which arises from the different refrangibility of the different coloured rays, yet in the more difficult part of the theory of optical instruments which relates to the correction of the spherical aberration, the necessity of algebraic investigation has always been acknowledged; although, however, the subject is confessedly within its reach, a variety of causes have interfered with its successful prosecution, and the best artists are content to work their glasses by empirical rules. In the investigations detailed in this paper, the

author's object is, first to present, under a general and uniform analysis, the whole theory of the aberration of spherical surfaces; and then to furnish practical results of easy computation to the artist, and applicable, by the simplest interpolations, to the ordinary materials on which he works. In pursuing these ends he has found it necessary somewhat to alter the usual language employed by optical writers;—thus, instead of speaking of the *focal length* of lenses, or the *radii of their surfaces*, he speaks of their *powers* and *curvatures*; designating, by the former expression, the quotient of unity by the number of parts of any scale which the focal length is equal to; and by the latter, the quotient similarly derived from the radius in question.

After adverting to some other parts of the subject of this paper, more especially to the problem of the destruction of the spherical aberration in a double or multiple lens, and to the difficulties which it involves, Mr. Herschel observes, that one condition, hitherto unaccountably overlooked, is forced upon our attention by the nature of the formulæ of aberration given in this paper; namely, its destruction not only from parallel rays, but also from rays diverging from a point at any finite distance, and which is required in a perfect telescope for land objects, and is of considerable advantage in those for astronomical use: 1st, The very moderate curvatures required for the surfaces; 2nd, That in this construction the curvatures of the two exterior surfaces of the compound lens of given focal length vary within very narrow limits, by any variation in either the refractive or dispersive powers at all likely to occur in practice; 3rd, That the two interior surfaces always approach so nearly to coincidence, that no considerable practical error can arise from neglecting their difference, and figuring them on tools of equal radii.

An Account of the Skeletons of the Dugong, Two-horned Rhinoceros, and Tapir of Sumatra, sent to England by Sir Thomas Stamford Raffles, *Governor of Bencoolen. By Sir* Everard Home, *Bart. V.P.R.S.* Read March 22, 1821. [*Phil. Trans.* 1821, *p.* 268.]

In this paper, Sir Everard first describes, by reference to an annexed drawing, the peculiar form of the skeleton of the dugong, which he compares to a boat without a keel, with the bottom uppermost; so that in the sea the middle of the back is the highest point in the water; and as the lungs are very extensive, they render the animal buoyant. As a compensation for legs, the dugong has a peculiar means of suspending itself in the sea, the centre of the back forming the point of suspension, similar to the fulcrum of a pair of scales; this peculiarity explains the form of the jaws, which are placed at an angle with the skull, unlike those of any other animal.

There is no remarkable difference between the bones of the two-horned rhinoceros, compared with those of the single-horned species, except that the projection in front of the skull, formed by the union of the nasal bones, is more nearly in a straight line and more ex-